Title: Breast cancer education for schoolgirls: An exploratory study.

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Abstract (247 words)

Objectives Adolescent girls are an important target group for breast cancer education and promoting breast awareness. However, research has not established schoolgirls perceived importance of breast cancer education, or explored factors which may impact engagement. This study aimed to identify schoolgirls concerns about breast cancer, desire to know more and perceived importance of breast cancer education, and explored associations with demographic factors.

Methods Of 2089 schoolgirls (11-18 years) surveyed, 1958 completed all relevant breast cancer questions and demographic factors (ethnicity, school type, breast size, physical activity level and age). Chi-squared tests assessed associations between demographics, desire to know more and perceived importance of breast cancer.

Results 44% of schoolgirls reported concerns about breast cancer, 72% wanted to know more, and 77% rated the topic as extremely important. Breast size was not associated with wanting to know more about breast cancer. Schoolgirls who wanted to know more about breast cancer were White, from single sex schools with boys at sixth form, more physically active and older. However, among other ethnic groups, school types and physical activity levels the proportion of girls who wanted to know more about breast cancer was still high (≥61%).

Conclusions This study provides evidence of the need for breast cancer education for schoolgirls across all school types, irrespective of breast size or physical activity levels. Results highlight the need to be inclusive and engage schoolgirls from all ethnic groups and to promote breast awareness at a young age to ensure effective breast cancer education.

Keywords: Breast cancer; breast awareness; adolescents; breast education; school,

Introduction

Breast cancer is the most common malignancy among females worldwide and is the leading cause of cancer-related mortality (Jemal et al., 2011; Youlden et al., 2012; World Health Organisation, 2014; American Cancer Society, 2015). It is well established that early detection may improve breast cancer outcome and survival (Shen et al., 2005; American Cancer Society, 2015). For example, statistics from Cancer Research UK (2014) indicate that when breast cancer is detected early, in the localised stage, the 5-year survival rate is more than 90%. Furthermore, it is recognised that adolescence is a critical period where lifelong behaviours are established; health habits formed at this age can be maintained throughout an individual's lifespan (Naidoo and Wills, 2000; Williams, Holmbeck & Greenleey, 2002). Therefore, adolescent girls are an important target group for breast cancer education and the promotion of breast awareness (Ogletree et al., 2004; Karayut et al., 2008; Ranasinghe et al., 2013). However, previous research has yet to establish whether schoolgirls want to know more about this topic.

Limited research has focused on breast cancer knowledge, attitudes and behaviours among adolescents. Studies that have focused their attention in this area have concentrated on breast self-examination (BSE), identifying poor breast cancer knowledge and low adherence to BSE (Clark et al., 2000; Ludwick and Gaczkowski, 2001; Ogletree et al., 2004; Malak and Dicle, 2007). However, many policy-making and health education institutions within the UK and the United States have moved away from the popular belief that it is wise to conduct BSE and instead advocate 'being breast aware' (Department of Health, 1991; Royal College of Nursing, 1995; Rosolowich, 2006). Despite recommendations from the American College of Obstetricians and Gynecologists (2006) that breast cancer prevention counselling for adolescents should be a routine component of preventative health, few educational initiatives

on breast cancer and breast awareness currently target adolescent audiences (Harris et al., 2009).

Schools are an ideal setting for health promotion (Naidoo and Wills, 2000), offering a sustainable and cost-effective method to reach a broad population of adolescents (Kwan et al., 2005). Health initiatives in schools target issues such as tobacco and substance use (Ellickson et al., 2003; Murray & Belenko, 2005; Evers et al., 2012), unintended pregnancy and sexually transmitted infections (Vivancos et al., 2013), and unhealthy dietary patterns (Craven et al., 2011). However, the topics addressed vary from school to school, and limited attention has been given to breast cancer education. As early detection remains the cornerstone of breast cancer control, the inclusion of breast cancer education in schools should be considered. It may provide an opportunity to foster positive attitudes towards breast health, increasing the likelihood of girls practicing positive breast health behaviours in adulthood.

The primary aim of this study is to investigate a) whether schoolgirls have concerns about breast cancer, b) whether schoolgirls want to know more about breast cancer, and c) how important schoolgirls feel breast cancer education is. The effectiveness of breast cancer education may be enhanced through a greater understanding of the factors associated with schoolgirls desire to know more about breast cancer. Therefore, secondly, this study aims to explore associations between schoolgirls desire to know more about breast cancer with demographic factors including; ethnicity, school type, breast size, level of physical activity at school and age.

Methods

Survey Instrument

The data from this study derive from a breast survey developed by four researchers (three breast health specialists and one psychologist). The breast survey was administered to 2089 adolescent schoolgirls aged 11 to 18 years and included questions relating to breast cancer. Initial dichotomous choice questions included; 'Do you currently or have you ever had concerns about how to check yourself for signs of breast cancer?' and 'Would you like to know more about how to check yourself for signs of breast cancer?'. Schoolgirls were then asked to rate the importance of learning about how to check yourself for signs of breast cancer on a 5-point Likert scale, ranging from 'not important' to 'extremely important'. Demographic information was collected including; ethnic group (White, Asian, Black/African/Caribbean, mixed/multiple ethnic groups, other ethnic group), school type attended (single-sex, mixed, single-sex with boys at sixth form only), breast size (underband and breast cup size), frequency of participation in physical activity at school (< once a week, once a week, twice a week, ≥ 3 times a week) and age (years).

Procedure

Adolescent schoolgirls were recruited through contacts at secondary schools or colleges in England, who were given the option to use an opt-in or opt-out procedure for parent/guardian consent. All schools and colleges chose the opt-out method whereby parents who did not wish their children to participate were required to return the consent form. Full institutional ethical approval was obtained prior to data collection and all data were anonymous. Inclusion criteria were minimal (female, aged 11 to 18 years) and surveys were completed in either paper format (n = 1869) or online using googleforms (n = 220) according to the schools preference. Following standardised training, paper based survey responses were manually

entered into Microsoft Excel (2010) by two researchers. Electronic submissions were automatically logged. A more detailed description of survey methods is presented elsewhere (Scurr et al., 2016).

Data handling and statistical analysis

Surveys were included in the analysis if schoolgirls completed all the relevant questions. Of the 2089 surveys received, 131 (6.3%) were missing responses to these questions and were excluded, leaving a final sample size of 1958 for analysis. Missing data varied for other items but were minimal except for breast size (889 schoolgirls did not provide breast size data). Schoolgirls were categorised as having smaller breasts (≤ C cup; 78%) or larger breasts (≥ D cup; 22%) (Dundas et al., 2007; Scurr et al., 2011; Brown et al., 2014a,b; White et al., 2015). Percentages were used to determine the number of schoolgirls who reported a) having concerns about breast cancer, b) wanting to know more about breast cancer, and c) the importance of learning about breast cancer. Further analysis using Predictive Analytic Software (PASW) was conducted with statistical significance set at 0.05 for all analyses. Chi-square tests were used to compare categorical variables (ethnicity, school type, breast size and physical activity level) between schoolgirls who did want to know more about breast cancer and those who did not. To determine which differences contribute to the Chi-squared test results, standardised adjusted residuals for the cell percentage of each subgroup were examined, with residuals >1.96 for a given subgroup percentage indicating that the subgroup differed significantly ($p < 0.05$) from the overall group percentage (MacDonald and Gardner, 2000). Differences in age between schoolgirls who did and did not want to know more about breast cancer were analysed using an independent t-test.

Results

Almost half (44%) of schoolgirls reported that they were worried about breast cancer, with 72% reporting that they would like to know more about this topic. Over three-quarters (77%) of schoolgirls who wanted to know more about breast cancer rated the topic as extremely important (Figure 1). Interestingly, 40% of schoolgirls who reported not wanting to know more still rated the topic as extremely important.

Figure one near here

Ethnic group was associated with wanting to know more about breast cancer ($X^2 = 25.682$, $p < 0.001$), and with importance ratings of learning about breast cancer ($X^2 = 54.457$, $p < 0.001$). Significantly more White schoolgirls (76%), and significantly less Asian schoolgirls (65%) wanted to know more about breast cancer (Figure 2) and schoolgirls from Black and Ethnic minority groups were three times more likely to rate the topic as 'not important' (range 8% to 11%) compared to White schoolgirls (3%) (Table 1).

Figure two near here

Among schoolgirls who wanted to know more about breast cancer (n = 1394), ethnicity was not associated with importance ratings ($X^2 = 15.941$, $p = 0.457$). However, among schoolgirls who did not want to know more about breast cancer (n = 545), White schoolgirls were more likely to provide higher importance ratings, and all other ethnic groups more likely to provide lower importance ratings ($X^2 = 39.265$, $p = 0.001$).

Table one near here

The majority (40%) of schoolgirls attended a single-sex school, with the remainder attending a single sex school with boys at sixth form only (34%), or a mixed school (26%). Significantly more schoolgirls from single sex schools with boys in sixth form wanted to know more about breast cancer (80%), and significantly less schoolgirls from single sex (68%), and mixed (69%) school wanted to know more about breast cancer ($X^2 = 28.706$, $p < 0.001$).

Breast size was not associated with wanting to know more about breast cancer ($X^2 = 1.515$, $p = 0.218$), however frequency of participation in physical activity was ($X^2 = 23.852$, $p < 0.001$) (Figure 3). Significantly less schoolgirls participating < once a week, and significantly more schoolgirls participating ≥3 times a week, reported wanting to know more about breast cancer (61% and 77%, respectively). Schoolgirls who reported wanting to know more about breast cancer were significantly older (13.7 ± 1.5 years) than those who reported that they did not want to know more (13.6 ± 1.4) ($t = 2.466$, $p = 0.015$).

Figure 3 near here

Discussion

This study provides evidence of the need for breast cancer education for schoolgirls with nearly half (44%) of schoolgirls reporting concerns about breast cancer and 72% reporting that they want to know more about this topic. Over three-quarters (77%) of schoolgirls reported wanting to know more about breast cancer and rated breast cancer education as extremely important. Previous studies have identified a need to increase adolescent girls knowledge about the risks of breast cancer and benefits of early detection (Johnson and Dickson-Swift, 2008; Karayut et al., 2008; Ranasinghe et al., 2013). The results of this study

support these findings and highlight the need for breast cancer education in schools. It was interesting to note that breast cancer education was also rated as extremely important by 40% of schoolgirls who reported that they did not want to know more about breast cancer. A potential explanation for this could be that they felt they already had sufficient knowledge about this topic, or alternatively that there may be potential barriers that need to be addressed so that schoolgirls feel comfortable learning about this topic.

The results of this study also identified factors associated with schoolgirls' desire to know more about breast cancer. Compared with White schoolgirls, schoolgirls from Black and Ethnic minority groups were less likely to want to know more about breast cancer. They were also three times less likely to rate the topic as 'important'. These results support previous research in adults that breast cancer knowledge and awareness is worse in Black and Ethnic minority women compared to White women (Scanlon and Wood, 2005; Waller et al., 2009). Although the incidence of breast cancer is lower in Black and Ethnic minority women, women from this population are more likely to be diagnosed with metastatic cancer and to die from it (Hoare, 1996; Waller et al., 2009). This is reportedly due to poorer knowledge of breast cancer symptoms and less practicing of breast awareness compared with White women, which can delay diagnosis affecting treatment options and prognosis (Jack et al., 2009; Scanlon and Wood, 2005). In research with adults, cultural and religious beliefs, embarrassment (for example, not being seen naked), and seeing cancer as a 'taboo' subject to talk about, have been recognised as barriers to learn about cancer and to participate in health promotion activities (Thomas et al., 2005; Waller et al., 2009). The importance of inclusive breast awareness education that is relevant to, and appropriate for, diverse adult populations is recognised in the literature (Dein, 2004; Scanlon and Wood, 2005; Thomas et al., 2005).

The results of the present study highlight the importance of ensuring any breast cancer education programme for schoolgirls engages schoolgirls of all ethnic groups.

Previous research has identified that girls respond better when learning about sensitive topics, such as sex education, in single-sex environments (Measor et al., 1996; Strange et al., 2003). The results of this study reported that significantly more girls from single sex schools with boys in the sixth form wanted to know more about breast cancer (80%), suggesting that schoolgirls from this school type would engage with breast cancer education. However, more than two thirds of girls from single sex (68%) and mixed (69%) schools wanted to know about breast cancer, highlighting the need to education schoolgirls across all school types.

Previous research has demonstrated that larger breasted women perceive themselves at greater risk of developing breast cancer (Asobayire and Barley, 2014). Furthermore, larger breasted females reportedly experience higher incidence of breast issues such as breast pain and incorrect bra fit, compared to smaller breasted females (Brown et al., 2014a,b; Scurr et al., 2011, 2016). However, in this study breast size showed no association with schoolgirls desire to know more about breast cancer. Therefore, breast cancer education should target all schoolgirls, irrespective of breast size.

Significantly more physically active schoolgirls wanted to know more about breast cancer, compared to those who were less physically active. Consistent with previous studies (Divine and Lepisto, 2005; King et al., 2014), the more active schoolgirls may have been more health conscious, with stronger health beliefs. Although the results have indicated that more physically active schoolgirls wanted to know more about breasts cancer, the majority of

inactive schoolgirls (61%) also wanted to know about this topic, suggesting that among inactive girls breast cancer is still a concern.

The results of this study identified that older schoolgirls wanted to know more about breast cancer compared with younger schoolgirls. Previous research identified that younger girls are less aware of breast cancer than older girls (Karayut et al., 2008; Bradbury et al., 2012) and therefore any breast cancer education intervention should seek to engage younger (< 13.6 years) schoolgirls to encourage healthy behaviours throughout their lives.

Conclusion

This study provides evidence of the need for breast cancer education for schoolgirls. Nearly half of schoolgirls reported concerns about breast cancer and nearly three quarters wanted to know more about this topic, rating it as extremely important. Additionally, this study identified that ethnicity was associated with schoolgirls desire to know more breast cancer. Results showed less schoolgirls from Black and Ethnic minority groups wanted to know more about this topic and rated the topic as less important than White schoolgirls, highlighting the need for a breast cancer education programme that is inclusive and engages schoolgirls of all ethnic groups. Breast size was not associated with the desire to know more about breast cancer and whilst school type and levels of physical activity were, there was no direction to the association, suggesting that breast cancer education is needed across all school types, and irrespective of schoolgirls breast size or physical activity levels. Older schoolgirls were significantly more likely to want to know more about breast cancer compared to younger schoolgirls, highlighting the need for promoting breast awareness at a young age. Consideration of the above factors is important for the delivery of effective breast cancer education for schoolgirls to encourage positive health behaviours that may continue into adulthood.

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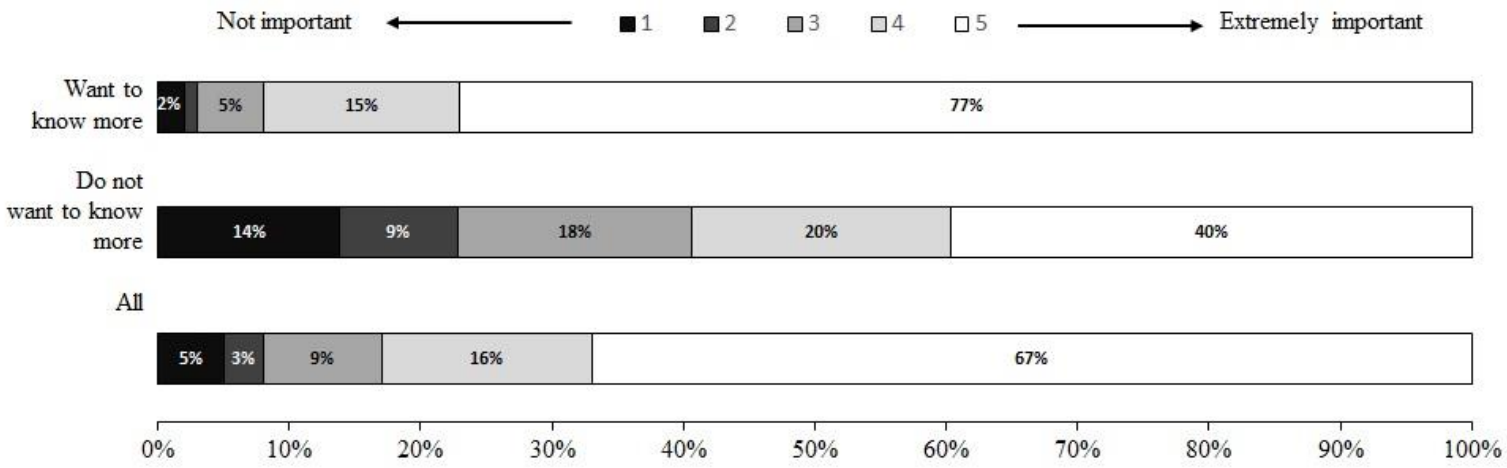

Figure 1. The importance of breast cancer education rated on a scale of 1 to 5 (1 = not important, 5 = extremely important) by all schoolgirls (n = 1958), those who reported wanting to know more about breast cancer (n = 1389) and those who did not want to know more (n = 535).

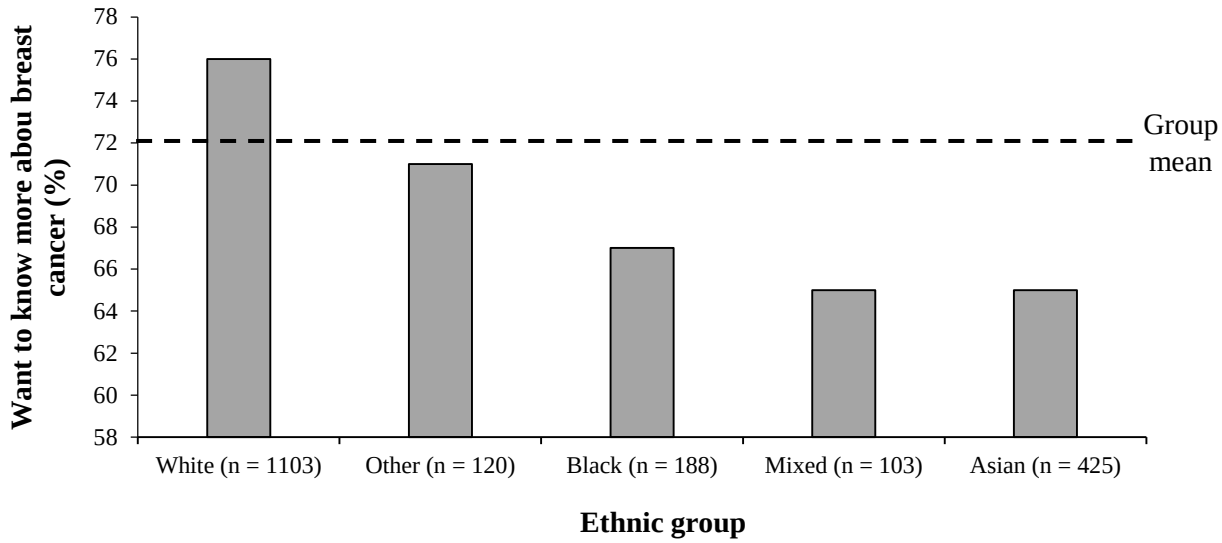

Figure 2. Percentage of schoolgirls who reported wanting to know more about breast cancer by ethnic group (n = 1939).

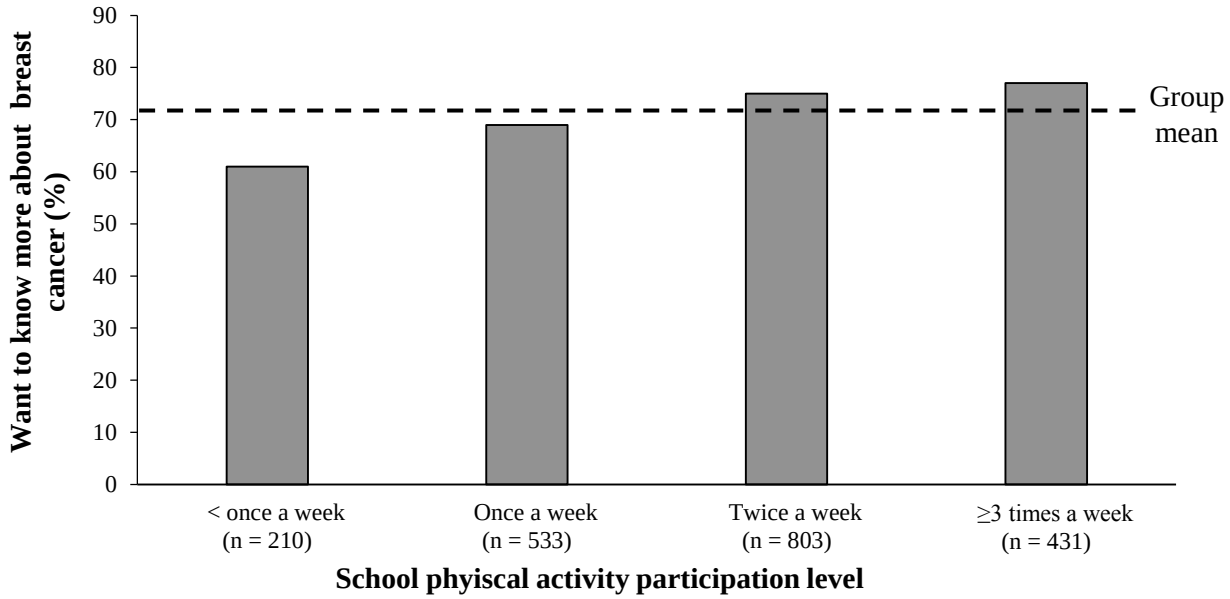

Figure 3. Percentage of girls wanting to know more about breast cancer reported by frequency of participation in physical activity at school (n = 1977).

Table 1. The importance of breast cancer education rated on a scale of 1 to 5 (1 = not important, 5 = extremely important) by all schoolgirls (n = 1958), those who reported wanting to know more about breast cancer (n = 1389) and those who did not (n = 535) by ethnic group.

Group	Ethnic group	Importance rating of learning about breast cancer (1 = not important, 5 = extremely important)					X^2
		1	**2**	**3**	**4**	**5**	
All (n = 1939)	White	3%	3%	8%	18%	68%	54.457*
		-6.0	-1.3	-0.5	2.4	1.7	
	Other	10%	3%	9%	17%	61%	
		2.4	-0.5	0.2	0.4	-1.3	
	Black	10%	2%	10%	11%	67%	
		2.8	-0.9	0.7	-2.2	0.3	
	Mixed	11%	2%	7%	13%	67%	
		2.5	-0.8	-0.7	-0.8	0.1	
	Asian	8%	5%	9%	15%	63%	
		2.4	2.8	0.4	-1.1	-1.5	
Want to know more about breast cancer (n = 1394)	White	1%	1%	5%	16%	77%	15.941
		-1.9	0.9	-1.8	1.5	0.1	
	Other	4%	1%	6%	16%	73%	
		1.2	0.2	0.2	0.4	-0.9	
	Black	3%	0%	7%	9%	81%	
		1.2	-1.2	0.9	-2.0	1.1	
	Mixed	3%	2%	9%	10%	81%	
		0.7	0.4	-0.3	-1.1	0.8	
	Asian	2%	1%	7%	15%	75%	
		0.4	-0.5	1.5	-0.1	-0.8	
Do not want to know more about breast cancer (n = 545)	White	7%	8%	21%	24%	40%	39.265*
		-4.6	-0.8	2.2	2.6	-0.1	
	Other	26%	6%	17%	20%	31%	
		2.1	-0.7	0.0	0.0	-1.1	
	Black	22%	6%	16%	14%	42%	
		2.0	-0.2	-0.3	-1.2	0.2	
	Mixed	25%	3%	11%	19%	42%	
		2.0	-1.3	-1.0	-0.1	0.2	
	Asian	17%	14%	13%	14%	42%	
		1.4	2.9	-1.7	-2.1	0.5	

* Statistically significant association between ethnic group and importance ratings.
Underlined cells show significant adjusted standardized residuals